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UNITED STATES DISTRICT COURT

NORTHERN DISTRICT OF CALIFORNIA

SAN FRANCISCO DIVISION

SYNAPTICS, INCORPORATED, Plaintiff, vs. ELANTECH DEVICES CORP, Defendant.	Case No. **CV 07 6434 CRB** **DECLARATION OF DR. IAN SCOTT MACKENZIE IN SUPPORT OF ELANTECH DEVICES CORPORATION'S RESPONSIVE CLAIM CONSTRUCTION BRIEF CONCERNING U.S. PATENT NO. 7,109,978**

I Ian Scott MacKenzie Ph.D. declare as follows:

I. INTRODUCTION

1. I have been retained by Elantech Devices Corporation ("Elantech") as an expert in the field of human-computer interfaces. I hold a Ph.D. from the University of Toronto (1991), and M.Ed. degree, also from the University of Toronto (1989), a Diploma in Electronics Engineering Technology, Computer Option, from Durham College (1978), and a B.Mus. from Queen's University (1975). I am currently an associate professor of Computer Science and Engineering at York University, Toronto Canada since 1999. From 1992 to 1999, I was an associate professor of Computing and Information Science at the University of Guelph, Guelph, Ontario, and from 1983 to 1991 I was a professor of Electronics Engineering at Seneca College, Toronto, Ontario. I am intimately familiar with the technological issues and state of the art in this field from the mid-1980s until the present. In particular, I have substantial research experience with pointing and touch sensor input devices. As a consequence of my research, I have designed and analyzed numerous touch sensor input devices. I have over 100 peer-reviewed research publications, many relating to pointing- or touch-based user interfaces or to microcontrollers. A copy of my current CV is attached hereto as **Exhibit A**.

2. I submit this Declaration on behalf of Elantech Devices Corporation ("Elantech") concerning U.S. Patent No. 7,109,978 ("the '978 patent"), attached as **Exhibit B**. I understand that Synaptics has submitted in this lawsuit the Declaration of Dr. Andrew Wolfe in support of Synaptics' Claim Construction Brief for the '978 patent. I have been asked to address the opinions asserted by Dr. Wolfe in his Declaration, and provide my opinions on the proper construction of the disputed terms of the '978 patent, including the technology at issue disclosed in the '978 patent.

3. In forming my opinions, I have reviewed the parties' Joint Claim Construction and Prehearing Statement and accompanying exhibits, including the opening and rebuttal expert reports provided by Dr. Andrew Wolfe on claim construction of the '978 patent on behalf of Synaptics, the documents identified in my opening and rebuttal expert reports on claim

construction of the '978 on behalf of Elantech, the '978 patent, its file history, and cited references.

4. I am compensated at my ordinary rate of $350.00 an hour for my time as an expert in this lawsuit. My compensation in no way depends on the outcome of this lawsuit.

5. I also understand that discovery in this lawsuit is ongoing and that depositions and documents related to issues addressed in this report may be produced after my Declaration has been served. For example, it is my understanding that the inventors of the '978 Patent have not been deposed. Accordingly, I may supplement this report as additional information becomes available to me.

II. LEVEL OF ORDINARY SKILL

6. I have interpreted the disputed terms of the '978 patent from the perspective of one of ordinary skill. Based on my experience with human-computer interfaces and my review of the '978 patent, it is my opinion that the level of ordinary skill at the time of the invention of the '978 patent would have at least:

(1) an undergraduate degree in Electrical Engineering or Computer Science and at least four years of experience in human-computer interface issues; or

(2) a master's degree in Electrical Engineering or Computer Science and at least two years of experience in human-computer interface issues.

7. Based on ¶ 12 of his Declaration, Dr. Wolfe's essentially agrees with my opinion of the level of ordinary skill for the '978 patent.

III. THE '978 PATENT

8. In my discussion of the '978 patent, I will address the background of the technology disclosed in the '978 patent, the problems recognized in the prior art by the inventors, and how the features of the invention overcome those problems. I will also address comments made by Dr. Wolfe regarding the '978 patent. I also refer to my description of the '978 patent in my opening and rebuttal reports and incorporate them by reference, which I understand were submitted to the Court as Exhibit E to the parties Joint Claim Construction and Prehearing Statement.

A. Background of the Technology

9. The '978 patent discloses a capacitive touch sensor pad having a matrix of traces or electrodes that are arranged in an X axis direction and Y axis direction and associated circuitry. **Exhibit B** ('978 patent) at FIGS. 1-2C; 9:42-58. The sensor pad scans the traces in both the X and Y axis directions to measure capacitance on them in determining whether an object or finger is present. *Id*. at Abstract, 4:55-67. In making this determination, the sensor pad computes a weighted average of all the capacitances measured on the traces in one dimension, referred to as a "centroid." *Id*. at 6:49-7:20; 12:27-13:61; 46:14-47:9. The measured capacitance values define a "profile" or curve based on the complete set of capacitance measurements. *Id*. at 4:17-18; 6:54-60; 7:3-5; 47:7. The sensor pad computes the centroid using the capacitance profile to detect certain gestures (a gesture being an action of a finger or object), which can be interpreted to control, *e.g.*, a cursor on a display. *Id*. at 1:27-33; 12:27-30.

B. Discussion of the Prior Art

10. Dr. Wolfe's discussion of the '978 patent fails to address the inventors' description of the prior art and the limiting effect it has on the scope of the '978 patent's claims. Specifically, I do not believe the asserted claims can be read so broadly to cover the exact methods the inventors criticize in their patent. In the Background section, the '978 patent criticized the design used for prior art two-dimensional capacitance systems having one set of driving and sensing circuitry, which could only scan the traces sequentially to measure capacitance:

> The shortcomings of the inventions and techniques described in the prior art can also be traced to the use of only one set of driving and sensing electronics, which was multiplexed sequentially over the electrodes in the tablet.

Id. at 4:3-6. One problem identified with the sequential scanning approach was susceptibility to noise:

> The sequential scanning approach of previous systems also made them more susceptible to noise. Noise levels could change between successive measurements, thus changing the measured signal and the assumptions used in interpolation routines.

Id. at 4:10-15. The problem of noise is "inherent in all prior art approaches that scan individual paths [sequentially]." *Id*. at 13:44-45. Such noise "may distort the finger profile because of noise appearing in a later scan cycle, but not an earlier one, due to a change in the noise level." The inventors criticized the slow speed of the sequential approach and praised the "fast response time" of the "so much faster" parallel method. *Id*. at 5:45-53; 7:20-26.

11. The '978 patent also makes reference to the Alps/Cirque GlidePoint touchpad device that could recognize basic tap, double-tap, and drag features to simulate mouse button actions. Such gesture detection was admitted by the inventors as known in the prior art. *Id*. at 4:30-34. The '978 patent, however, does not consider such gestures as multi-finger gestures. *Id*. at 4:33-35. As I will explain below, the '978 patent does not teach or enable how to detect the presence or location of individual objects among multiple objects on a sensor pad. Rather, the '978 patent only describes and supports detecting a "second-finger tap," in which "one finger remains resting on the pad while another finger taps to one side of the primary finger." *Id*. at 46:47-48.

C. The Invention Disclosed In the '978 Patent

1. The Simultaneous (In Parallel) Scanning Feature

12. Dr. Wolfe failed to address the inventors' repeated characterization of their invention as adopting a different design to overcome the problems with the prior art sequential approach, that is, one using a "parallel-sensing capability" that senses capacitance on all rows and columns of traces in parallel or simultaneously to develop capacitance profiles. For example, the patent repeatedly states that an object of their invention is to provide a capacitive system where row and column traces are sensed simultaneously:

> It is thus an object of the present invention to provide a two-dimensional capacitive sensing system equipped with a separate set of drive/sense electronics for each row and for each column of a capacitive tablet, wherein all row electrodes are sensed simultaneously, and all column electrodes are sensed simultaneously.

Id. at 4:55-60 (emphasis added); *see also Id*. at 5:5-12; 5:13-16. This new capability is made possible "by providing one set of electronics per row or column." As illustrated in Figures 2C and 3 of the '978 patent, the inventors describe "[a]ccording to the present invention, the capacitance at each touch sensor array 22 node is measured simultaneously using charge integrator circuits 44-1 through 44-n." *Id*. at 13:18-20. Thus, separate sets of drive and sensing circuitry 44-1 through 44-n are disclosed allowing capacitance to be measured in parallel at the same time. *Id*. at 13:18-20; 13:53-61.

13. Thus, the inventors explain that "by 'taking a snapshot' of all inputs simultaneously in X and then Y directions (or visa versa)," the problems in the prior art can be overcome. *Id*. at 13:53-55 (emphasis added). In particular, the parallel-sensing capability "allows the sensing cycle to be extremely short, thus allowing fast response while still maintaining immunity to very high levels of electrical interference [noise]." In fact, the inventors exclaim that "the present invention is so much faster than prior art techniques [sequential approach]." *Id*. at 7:24-26. Thus, unlike Dr. Wolfe, when interpreting the claims, I considered these characterizations by the inventors and found them to be limiting the scope of the claims. In particular, the scope of the claims is limited to capacitive touchpad devices that sense rows and columns of traces simultaneously or in parallel and cannot cover devices that use the sequential scanning approach.

2. The Second-Finger Tap Detection Feature

14. The '978 patent discloses three units for detecting gestures, the tap unit 280, zigzag unit 282, and push unit 284, all shown in FIG. 14. Because the asserted claims are all limited to determining a gesture resulting from the simultaneous presence of multiple-objects on the sensor pad, I will only discuss the zigzag unit 282 or processor, which is identified as the unit for allegedly detecting the simultaneous presence of multiple objects.[1] The zigzag unit 282 of

[1] The '978 patent states that "Those of ordinary skill in the art will note that the tap unit 280 is suitable for use with any touchpad that provides (X,Y) and finger-presence information, and push unit 284 is suitable for use with any touchpad that produces Z (pressure) information. Only the zigzag unit 282 depends on special characteristics of the particular touchpad technology disclosed herein, namely the fact that two fingers reliably report an averaged finger position." '978 patent at 50:54-61.

FIG. 14 "decodes a two-finger gesture in which one finger remains resting on the pad while another finger taps to one side of the primary finger," and refers to this gesture as a "second-finger tap." This is the only gesture the zigzag unit 282 can detect.

15. Specifically, FIGS. 18A through 18C describe how the zigzag unit 282 operates. Briefly, when a first finger is present on the touchpad, the arithmetic unit 16 computes a centroid and a first position is determined. *Id.* When a second finger touches down on the touchpad, there is an apparent rapid shift in the centroid to a new position, and when the second finger is lifted off, there is an apparent rapid shift in the centroid back to the first position. *Id*. at 46:46-49:67. Thus, "[b]ecause a second finger tap cannot be reliably recognized until the second finger is lifted, sudden cursor motions first to one side and then back again are unavoidably sent to the host." *Id*. at 46:57-60. The name "zigzag" refers to this back and forth motion.

16. I should note that according the '978 patent "[t]he position sensor of these embodiments [of the invention] can only report the position of one object on its sensor surface," and "[i]f more than one object is present, the position sensor of this embodiment computes the centroid position of the combined set of objects." *Id*. at 7:13-17. Thus, I disagree with Dr. Wolfe that the claimed invention can determine the location and presence of each individual object if more than one object is present on the sensor pad. The '978 patent does not describe, enable, or support detecting the location and presence of individual objects among a set of objects on the sensor pad when only one centroid can be computed at a time.

IV. CLAIM CONSTRUCTION OF THE '978 PATENT

A. The Asserted Claims and Disputed Terms

17. Synaptics asserts claims 1-4, 6, 8-11, and 13, and 16[2] of the '978 patent against certain models of Elantech's touchpad devices. Claim 1 is an independent method claim from which claims 2-3, 8, and 16 depend. Claim 4 is an independent apparatus claim from which claims 6 and 9 depend. Claim 10 is an independent apparatus claim from which claims 11 and 13 depend. Claim 1 (reproduced below) is representative:

[2] I understand that Synaptics is no longer asserting claim 18.

> 1. A method of processing a user input received on a capacitive touch sensor pad including a matrix of X and Y conductors, the method comprising the steps of:
>
> developing capacitance profiles in one of an X direction and a Y direction from said matrix of X and Y conductors, said capacitance profiles identifying a simultaneous presence of at least two user input objects on said capacitive touch sensor pad;
>
> examining said capacitance profiles to determine an occurrence of a single gesture resulting from the simultaneous presence of the at least two user input objects; and
>
> indicating the occurrence of said single gesture resulting from said simultaneous presence of the at least two user input objects.

Id. at 53:35-49. Among the terms recited in the asserted claims, I note that certain terms are part of larger phrases and believe the larger phrases should be construed as a whole rather than construing terms in isolation. I have set forth below the manner in which the claims should be properly construed.

B. The Proper Construction of the Disputed Terms

18. I have reviewed Dr. Wolfe's proposed construction of the disputed claim terms set forth in his Declaration and have substantial disagreements with most of them. In sum, I disagree with Dr. Wolfe's proposed construction because he uses a methodology that completely ignores express statements made by the inventors criticizing the prior art and the inventors' characterizations of the invention. It is my opinion that one of ordinary skill would not ignore such statements and would understand them to limit the scope of the claims so as not to read on the prior art devices the inventors criticize. Further, Dr. Wolfe reads claim terms beyond what is described and supported in the '978 patent's specification. Finally, Dr. Wolfe ignores or reads words out of a claim, *e.g.*, in giving "capacitance profiles" a meaning, he ignores how "profiles" is used in the patent and replaces it with "information."

19. I have defined the disputed terms and provided my support in my opening and rebuttal expert reports, which I incorporate by reference. Nevertheless, I will restate my positions here and address the positions taken by Dr. Wolfe in his Declaration. Although I may

not address every statement or conclusion given by Dr. Wolfe in his Declaration, it should not be taken that I necessarily agree with them.

1. "Capacitance Profile" Means "A Complete Set of Capacitance Measurements In An X or Y Direction"

20. The proper construction for "capacitance profile" means "a complete set of capacitance measurements in an X or Y direction." Dr. Wolfe's interpretation of this term as "capacitance information on conductive lines" simply ignores the word "profile" and replaces it with "information." This substitution of words does not aid a skilled artisan in understanding the meaning of this term, nor is it consistent with the teachings in the '978 patent. Specifically, the '978 patent refers to "profile", "profile centroid" and "profile curve" which require a complete set of measurements in the X and Y dimensions:

> The scanned information provides a profile of the finger proximity in each dimension. According to this aspect of the invention, the profile centroid is derived in both the X and Y directions and is the position in that dimension. The profile curve of proximity is also integrated to provide the Z information.

Id. at 12:29-34 (emphasis added). I should note that a complete set of measurements in the X and Y direction must be used to provide the "profile centroid" and "profile curve" for detecting the simultaneous presence of at least two objects required in the claims. The '978 patent also refers to "a profile of the finger" as "a complete set of sampled points [of capacitance]", and a "sensor trace profile" as having characteristics including width and shape, indicating that it is a curve. *Id*. at 6:54-56; 47:7. Thus, I do not believe one of ordinary skill would equate "profiles" with "information" based on the clear teachings in the '978 patent. Consistent with the specification, a "capacitance profile" is a complete set of capacitance measurements in an X or Y direction.

21. At ¶ 25 of his Declaration, Dr. Wolfe confirms that a capacitance profile comprises a complete set of capacitance measurements. Specifically, he states:

> [A] minute electrical field (imperceptible to the touch) is created by pulsing electricity across the grid. The presence of a finger or object on or near the touchpad alters the electrical field.

One of ordinary skill would read his statements as describing taking measurements on the grid of X and Y traces, to provide a full set of capacitance measurements. Dr. Wolfe also states that "these capacitance measurements can be aggregated and used to determine the position of the finger or other object on or near the grid of conductive lines." *Id*. Such an aggregation of capacitance measurements in the X and Y direction provides a "profile curve" as described in the '978 patent. At ¶ 32 of his Declaration, Dr. Wolfe also states the same thing. Thus, the '978 patent supports giving "profile" a meaning more specific than just "information. Moreover, the claims are directed to detecting a gesture resulting from the simultaneous presence of at least two objects. Without having the complete set of measurements available to compute a centroid, it would be impossible to detect such a gesture.

22. At ¶ 29 of his Declaration, Dr. Wolfe cites to the text "the capacitive information from the sensing process provides a profile of the proximity of the finger to the sensor in each dimension" at 7:3-5 to support his "ordinary meaning" interpretation. Yet, the "information" referred to is information obtained by simultaneously measuring capacitance on all the traces in the X and Y direction, which taken in proper context is a complete set of X and Y capacitance measurements that define a capacitance profile. Thus, there is no support in the '978 patent that describes using a partial set or an incomplete set of the capacitance measurements taken in the X and Y direction when detecting a gesture as suggested by Dr. Wolfe, but instead the patent requires a complete set of measurements.

2. "Developing Capacitance Profiles" Means "Simultaneously Measuring/Measure the Capacitance on All Sensor Traces in an X Direction or a Y Direction"

23. Each of the asserted claims recites "developing capacitance profiles," "develop a first capacitance profile," "develop at least one capacitance profile," and "developing capacitance profiles in both said X and Y directions." **Exhibit B** ('978 patent) at 53:38; 53:54-55; 53:63; 54:30. Dr. Wolfe's construction is too broad because "sensing and quantifying capacitive information on conductive lines" would cover the exact method the inventors criticized in their patent. In other words, I do not believe these terms cover just any way of developing capacitance profiles. As I will explain in detail below, I believe the inventors

disavowed from the scope of the claims the prior art sequential approach of developing capacitance profiles and limited the invention to a simultaneous/parallel way. Thus, in the proper context of the '978 patent's specification, the above terms must mean "simultaneously measuring the capacitance on all sensor traces in an X direction and Y direction."

24. First, as I have explained in ¶ 10 above, the '978 patent's background section criticized the prior art design of using one set of sensing circuitry to sense capacitance sequentially on rows and columns of traces. *Id*. at 4:3-6. One of the problems ignored by Dr. Wolfe with the prior art sequential scanning approach is susceptibility to noise:

> The sequential scanning approach of previous systems also made them more susceptible to noise. Noise levels could change between successive measurements, thus changing the measured signal and the assumptions used in interpolation routines.

Id. at 4:10-15 (emphasis added). The problem of noise is "inherent in all prior art approaches that scan individual paths [sequentially]." *Id*. at 13:44-45. Such noise "may distort the finger profile because of noise appearing in a later scan cycle, but not an earlier one, due to a change in the noise level." The inventors criticized the slow speed of the sequential approach and praised the "fast response time" of the "so much faster" parallel method. *Id*. at 5:45-53; 7:20-26. In my opinion, one of ordinary skill would not ignore this criticism of the prior art technique and instead would consider it and find it to disavow the prior art sequential scanning approach from the scope of the above terms.

25. Second, Dr. Wolfe ignored the repeated characterizations limiting the invention. The inventors repeatedly identified sensing simultaneously rows and columns of traces for the claimed two-dimensional capacitive systems of the invention:

> It is thus an object of the present invention to provide a two-dimensional capacitive sensing system equipped with a separate set of drive/sense electronics for each row and for each column of a capacitive tablet, wherein all row electrodes are sensed simultaneously, and all column electrodes are sensed simultaneously.

Id. at 4:55-60 (emphasis added); *see also Id*. at 5:5-12; 5:13-16. In the only embodiment of the sensing circuitry shown in FIGS. 2C and 3, the inventors describe "[a]ccording to the present

invention, the capacitance at each touch sensor array 22 node is measured simultaneously using charge integrator circuits 44-1 through 44-n." *Id*. at 13:18-20. By providing one set of electronics per row or column, capacitance measurements on the traces can be taken all at once. *Id*. at 13:18-20; 13:53-61.

26. Indeed, the inventors explain that "by 'taking a snapshot' of all inputs simultaneously in X and then Y directions (or visa versa)," the problems in the prior art can be overcome. *Id*. at 13:53-55 (emphasis added). In particular, this parallel-sensing capability "allows the sensing cycle to be extremely short, thus allowing fast response while still maintaining immunity to very high levels of electrical interference [noise]." In fact, the inventors exclaim that "the present invention is so much faster than prior art techniques [using the sequential approach]." *Id*. at 7:24-26. In view of these limiting statements, I believe one of ordinary skill would exclude from the scope of the claims the prior sequential scanning approach and read the above terms to only mean "simultaneously measuring the capacitance on all sensor traces in an X direction and Y direction."

27. At ¶¶ 33-35 of his Declaration, Dr. Wolfe renews his incorrect conclusion that not all embodiments of invention require "*all* traces in a particular direction be measured *simultaneously*." Although "there are two drive/sense methods employed in the touch sensing technology of the present invention," both methods require simultaneously measuring capacitance across all traces in at least one direction. *Id*. at 12:38-29; 12:49-50. In fact, Dr. Wolfe admits that "the first embodiment specifically describes 'the complete set of sampled points simultaneously giving a profile of the finger." Wolfe Decl. at ¶ 35. Thus, one of ordinary skill would conclude that all of the embodiments disclosed in the '978 patent simultaneously scan traces when measuring for capacitance.

28. Dr. Wolfe then refers to a "second drive/sense method" described at 6:51-7:5, and erroneously concludes that "the second method makes no mention of sensing or measuring lines simultaneously (as opposed to sequentially or in groups), nor does it state that all lines must be incorporated into the capacitive profile." Wolfe Decl. at ¶ 35. Yet, Dr. Wolfe completely ignores what the '978 patent states about the second method:

> According to a second drive/sense method, the voltages on all the X lines of the touch sensor array 22 are simultaneously moved in a positive direction, while the voltages of the Y lines are moved in a negative direction. Next, the voltages on all the X lines of the touch sensor array 22 are simultaneously moved in a negative direction, while the voltages of the Y lines are moved in a positive direction.

Id. at 12:48-55. In the paragraph immediately preceding the description of the two drive/sense methods, the inventors explain that "[t]he X and Y matrix nodes are driven and sensed in parallel…." Id. at 12:27-29.

29. Furthermore, referring to FIG. 3, the only embodiment of sensing circuitry disclosed in the '978 patent, the inventors describe that "[a]ccording to the present invention, the capacitance at each touch sensor array 22 node is measured simultaneously using charge integrator circuits 44-1 through 44-n." *Id*. at 13:18-20 (emphasis added). This embodiment and characterization of the "present invention" refers to both methods and, as a result, limits all embodiments for measuring capacitance in only one way – *i.e.*, simultaneously in contrast to sequentially. Moreover, one of ordinary skill would understand that the only difference between the first and second drive/sense methods is that in the first method, voltages on the X lines are held constant while voltages on the Y lines are simultaneously moved (and vice versa), whereas in the second method, the voltages on X lines are simultaneously moved in one direction while the voltages on the Y lines are simultaneously moved in an opposite direction. The effect of moving the voltages on both the X and Y lines in the second embodiment is to accentuate transcapacitance between the two dimensions and to de-emphasize virtual ground parasitic capacitance. *Id*. at 12:55-56. Thus, Dr. Wolfe's arguments do not support his construction, and "developing capacitance profiles" does not cover the prior art sequential approach.

3. "Identifying the simultaneous presence of at least two user input objects" Means "Recognizing a Second-Finger Tap"

30. The phrase "identifying a simultaneous presence of at least two user input objects," is recited in claim 1. *Id*. at 54:40-41. Dr. Wolfe believes this term should be interpreted using the ordinary meaning of the individual words to arrive at the definition of "determining

that two objects or fingers are on or near the touch pad." I disagree with his construction because it goes beyond the scope of the '978 patent.

31. The '978 patent's specification describes, supports and enables detecting one specific type of single gesture resulting from the simultaneous presence of at least two user input objects – *i.e.*, a "second-finger tap." In particular, the '978 patent discloses three units for detecting gestures, the tap unit 280, zigzag unit 282, and push unit 284 shown in FIG. 14. *Id*. at 34:4-8. Only the zigzag unit 282 can determine the occurrence of a single gesture resulting from the simultaneous presence of at least two user input objects. Specifically, the zigzag unit 282 "decodes a two-finger gesture in which one finger remains resting on the pad while another finger taps to one side of the primary finger," referred to as the "second-finger tap" gesture. *Id*. at 46:46-48.

32. Further, FIGS. 18A through 18C describe the operation for the zigzag unit 282. This operation computes a weighted average of all the capacitances in one dimension as a "centroid." *Id*. at 6:49-7:20; 12:27-13:61; 46:14-47:9. For a second-finger tap, the operation computes a centroid of a first finger present on the touchpad to determine a first position. *Id.* Next, when a second finger touches down on the touchpad, there is an apparent rapid shift in the computed centroid to a new position, and when the second finger is lifted off, there is an apparent rapid shift in the computed centroid back to the first position. *Id*. at 46:46-49:67. No other type of single gesture resulting from the simultaneous presence of at least two user input objects is taught or recognized. It is my opinion that one of ordinary skill would not interpret this term beyond what the '978 patent discloses and thus would understand the term to mean "recognizing a second-finger tap."

33. At ¶ 38 of his Declaration, Dr. Wolfe asserts that "two objects can be present simultaneously without the second finger being tapped." While this may be true, such a situation does not result in the detection of any particular multiple-finger gesture by the disclosed invention. That is, there is no single gesture resulting from the simultaneous presence of at least two user input objects that can be detected without the second finger being tapped. Dr. Wolfe fails to consider that the "position sensor of these embodiments [of the invention] can only report

the position of one object on its sensor surface," and "[i]f more than one object is present, the position sensor of this embodiment computes the centroid position of the combined set of objects." *Id*. at 7:13-17. When two objects are simultaneously present on the sensor pad, only one centroid is computed for the combined objects. The sensor pad cannot determine from one centroid if one or two objects are present, only when the second finger is lifted can a "zigzag" motion be detected to decode a second-finger tap – the only gesture supported and enabled by the '978 patent.

34. Also at ¶ 38 of his Declaration, Dr. Wolfe incorrectly states that Elantech's proposed construction would encompass the "hop" gesture. My definition of a second-finger tap is set forth by the '978 patent itself and is a "two-finger gesture in which one finger remains resting on the pad while another finger taps to one side of the primary finger." *Id*. at 46:46-48. One of ordinary skill in the art would not understand my definition to include the "hop" gesture which "never involves more than one finger on the pad at any one time." *Id.* at 40:36-37. Finally, at ¶ 38 of his Declaration, Dr. Wolfe states that the same phrase "simultaneous presence" is used in Elantech's '352 patent and incorrectly concludes that because Elantech's claims encompass numerous multiple-finger gestures, then Synaptics should be afforded a similar broad construction. The claims of the Synaptics' '978 patent should be construed in light of its own specification. Therefore, reference to Elantech's '352 patent is irrelevant for interpreting the above term.

4. "Gesture" Should Be Construed Together With "Resulting From the Simultaneous Presence Of the at Least Two User Input Objects" Which Means a "Second-Finger Tap"

35. This term is part of larger phrases recited in the asserted claims of the '978 patent. Dr. Wolfe, however, construed "gesture" alone to mean "finger or object action that communicates input to a device." The meaning of "gesture" in isolation is well known to those skilled in the art, which simply means "an action of a finger or object, either on a surface or in the air." The term "gesture," however, is used in a different context for the claims. For example, claim 1 recites "determine an occurrence of a single gesture resulting from the simultaneous presence of the at least two user input objects." *Id*. at 53:47-49. Thus, the term "gesture" is used

in the multi-object context. At ¶ 19 of his Declaration, Dr. Wolfe describes that "gesture" can encompass a wide range of actions of a finger or an object. Yet, Dr. Wolfe fails to realize "gesture" as claimed must result from the simultaneous presence of at least two user input objects. Dr. Wolfe does not even mention the "second-finger tap" gesture as an example of single gesture resulting from the simultaneous presence of the at least two user input objects disclosed in the '978 patent. Because "gesture" is used with the language "resulting from the simultaneous presence of the at least two user input objects," one of ordinary skill would understand "gesture" in that context and in view of the '978 patent as a "second-finger tap" gesture, as I have explained above.

36. At ¶ 23 of his Declaration, Dr. Wolfe refers to a hypothetical joystick as an example that the disclosed sensor can "detect multiple touching points in a joystick mode."[3] The cited text makes no reference to the simultaneous detection of multiple objects as required by the claims. Likewise, Dr. Wolfe's reference to a hypothetical musical keyboard in the '978 patent as another example is unavailing because the cited passage makes no reference to the simultaneous detection of multiple objects.[4] The "hop" gesture example cited by Dr. Wolfe is also irrelevant. Dr. Wolfe states that "the specification also describes the 'Hop' gesture as a gesture that involves two fingers." The '978 patent's specification, however, clearly states "while some users prefer to tap with a second finger in the hop gesture, this gesture never involves more than one finger on the pad at any one time." *Id*. at 40:35-37. None of Dr. Wolfe's examples adequately describe multi-object gestures resulting from the simultaneous presence of at least two fingers or objects.

37. Finally, Dr. Wolfe's interpretation of "gesture" in isolation is not entirely accurate. The finger or object action is not communicating input *per se*. Rather, it is the finger or object

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[3] The cited portion reads, in relevant part, "[T]he sensor of the present invention can be conformed to any surface and can be made to detect multiple touching points, making possible a more powerful joystick." '978 Patent at 53:1-3.

[4] The cited portion reads, in relevant part, "[M]usical keyboards (synthesizers, electric pianos) require velocity sensitive keys, which can be provided by the pressure sensing ability of this sensor. There are also pitch bending controls, and other slide switches that could be replaced with this technology. An even more unique application comprises a musical instrument that creates notes as a function of the position and pressure of the hands and fingers in a very articulate 3-d interface." '978 Patent at 53:9-16.

action that is interpreted to communicate an input. The location, movement, and pressure applied of a finger or object on a touch sensitive surface is what is detected. In the context of the '978 patent, circuitry connected to the X and Y matrix nodes simultaneously detect capacitances and generate "capacitance profiles." It is these circuits connected to the matrix nodes that communicate capacitance profiles to an arithmetic logic unit for processing. *Id*. at 12:60-14:63. Therefore, I disagree with "that communicates input to a device" part of Dr. Wolfe's definition of "gesture" alone.

5. "Examining Said Capacitance Profiles to Determine an Occurrence of a Single Gesture" means "Computing/Compute the Centroid (i.e., X, Y position) and pressure (i.e., Z value) information and Comparing/Compare (X, Y, Z) Values to Recognize a Second-Finger Tap"

38. The phrase "examining said capacitance profiles to determine an occurrence of a single gesture" is recited in claim 1, while the phrase "examine said first capacitance profile" is recited in claim 4, and the phrase "examine said at least one capacitance profile" is recited in claim 10. *Id*. at 53:43-46; 54:2-5; 54:32-34. The '978 patent describes only one example of examining or processing profiles. Specifically, examining the profiles involves deriving a digital value representing the centroid for X and Y position and a digital value representing the Z pressure information. *Id*. at 7:6-12; 12:31-34. These values are used by the zigzag unit 282 to recognize a back and forth motion characteristic of a second-finger tap. *Id*. at 47:3-49:67. Thus, consistent with the teachings in the '978 patent, in my opinion, one of ordinary skill in the art would understand these terms to mean to mean "computing/compute the centroid (i.e., X, Y position) and pressure (i.e., Z value) information and comparing/compare (X, Y, Z) values to recognize a second-finger tap."

39. At ¶ 41 of his Declaration, Dr. Wolfe suggests my construction reads in specific steps from an embodiment in the specification. Dr. Wolfe, however, fails to understand that the specification describes, supports, and enables only one method for identifying a simultaneous presence of at least two user input objects which involves detecting a "second-finger tap." More specifically, that method computes the centroid and pressure information and compares the (X, Y, Z) values to recognize the second-finger tap. *Id*. at 7:6-12; 12:31-34. Further, in context of the

claims and specification, "single gesture" refers to a gesture involving two or more objects – which in this case is the second-finger tap. Additionally, Dr. Wolfe's construction improperly equates "examining … profiles" with "processing … information." This simple substitution of words offers no guidance to ascertain the meaning of the above terms.

6. "Single gesture resulting from the simultaneous presence of the at least two user input objects" Means "A Second-Finger Tap"

40. The phrase "single gesture resulting from the simultaneous presence of the at least two user input objects" is recited in claim 1, while the phrase "single gesture resulting from the simultaneous proximity of at least two input objects" is recited in claim 4, and the phrase "single gesture resulting from the simultaneous proximity of at least two user input objects" is recited in claim 10. *Id*. at 53:47-49; 54:3-5; 54:36-37. As explained in this Declaration and in my expert reports, the second-finger tap is the only two-finger gesture resulting from the simultaneous presence of at least two user input objects that is described, supported, and enabled in the '978 patent, and is the only single gesture resulting from the simultaneous presence of at least two user input objects that can be recognized by the disclosed invention. Thus, consistent with the teachings in the '978 patent, in my opinion, one of ordinary skill in the art would understand the above terms to mean "a second-finger tap," *i.e.*, a two-finger gesture in which one finger remains resting on the pad while another finger taps to one side of the primary finger.

41. At ¶ 45 of his Declaration, Dr. Wolfe again misleadingly states that the '978 patent describes "many types of gestures," but does not state that the only gesture relating to the simultaneous presence of at least two objects required by the claims is the second-finger tap. As I have already explained, the '978 patent describes and enables reporting only the position of one object on its sensor surface. *Id*. at 7:13-14. If more than one object is present, the position sensor computes the centroid position of the combined set of objects. Id. at 7:14-17. Only when it detects a zigzag motion can the zigzag unit 282 determine such a motion to be a second-finger tap. As I have previously stated, it would be impossible to recognize other single gestures resulting from the simultaneous presence of the at least two user input objects when reporting the position of only one object at a time.

7. "Indicating/Indicate the Occurrence of Said Single Gesture" Means "Indicating the Occurrence of a Second-Finger Tap"

42. The phrase "indicating the occurrence of said single gesture" is recited in claim 1, while the phrase "indicate the occurrence of said single gesture" is recited in claim10. *Id.* at 53:47; 54:35-36. The '978 patent describes the zigzag unit 282 which recognizes only second-finger taps. A leftward zigzag may be used to simulate a left mouse button click and a rightward zigzag may be used to simulate a right mouse button click (47:21-23). As described by the inventors, the output of the zigzag unit is one of "LEFT, RIGHT, or NONE" (47:39-40). Thus, consistent with the teachings in the '978 patent, in my opinion, one of ordinary skill in the art would understand the above terms to mean "indicating the occurrence of a second-finger tap." Dr. Wolfe's construction for these terms relying solely on the ordinary meanings of individual words goes beyond the scope of the '978 patent. "Single gesture" is used in the context of the simultaneous presence of multiple objects and the only single gesture resulting from the simultaneous presence of the at least two user input objects that is supported in the '978 patent is the second-finger tap.

8. "Signal Representing a Simulated Mouse Button Click" Means "A Value of LEFT or RIGHT Denoting a Second-Finger Tap"

43. The phrase "signal representing a simulated mouse button click" is recited in claim 2, while the phrase "signal representing a simulated mouse action" is recited in claims 11 and 16. Id. at 53:51-52; 54:39-40; 54:52-53. As explained above, the '978 patent describes the zigzag unit 282 which recognizes second-finger taps. A leftward zigzag may be used to simulate a left mouse button click and a rightward zigzag may be used to simulate a right mouse button click (47:21-23). As described, the output of the zigzag unit is one of "LEFT, RIGHT, or NONE" (47:39-40). Thus, consistent with the teachings in the '978 patent, in my opinion, one of ordinary skill in the art would understand the above terms to mean "a value of LEFT or RIGHT denoting a second-finger tap."

44. I also disagree with Dr. Wolfe's claim construction for these terms because his definitions are taken outside the context of the '978 Patent and its claims. For instance, these terms are associated with the occurrence of "said single gesture," which has been explained to

have only one meaning – a second-finger tap. Because "said single gesture" can only mean a second-finger tap, then "signal representing a simulated mouse button click" and "signal representing a simulated mouse action" both must mean "a value of LEFT or RIGHT denoting a second-finger tap."

45. At ¶ 49 of his Declaration, Dr. Wolfe states the above terms refer to any signal that represents to the system a mouse button click. Because the above terms are tied to the "single gesture" which is used in the context of a second-finger tap, all of Dr. Wolfe's explanations fail because they are unsupported in the '978 patent. The only signals supported by the patent for a second-finger tap are values of LEFT or RIGHT denoting a second-finger tap. At ¶ 51 of his Declaration, Dr. Wolfe states that "[t]he term 'simulated mouse action' is clearly a different and broader term than "simulated mouse click." While in a vacuum this statement might be true, it is not true for the purpose of construing these claim terms. In the context of the asserted claims, "simulated mouse button click" and "simulated mouse action" mean the same thing. This is because the '978 patent does not describe any other "said single gesture" besides a second-finger tap and does not disclose anywhere indicating "said single gesture" by anything other than a simulated mouse button click.

46. At ¶ 52 of his Declaration, Dr. Wolfe refers to gesture unit 20 to infer it can detect other gestures besides a second-finger tap, but this is irrelevant for purposes of claim construction because all of the asserted claims require identifying the simultaneous presence of at least two objects, which has been explained repeatedly to implicate a second-finger tap. Dr. Wolfe's misleading cites to the '978 patent do not support his claim construction positions for the above terms.

47. I declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct.

Executed on October 3, 2008 at Palo Alto, California.

/s/
Dr. Ian Scott MacKenzie

FILER'S ATTESTATION

Pursuant to General Order No. 45, Section X (B) regarding signatures, I, S. H. Michael Kim, attest that concurrence in the filing of this document has been obtained.

/s/
S. H. Michael Kim

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